



Mechanical Fitting instructions for
MFK129 and MFK129/B

COMMODORE V6 TO TOYOTA HILUX/4RUNNER
4-cylinder petrol or diesel with
STANDARD G52 5-SPEED TRANSMISSION
or HEAVY DUTY R151 5-SPEED

Thank you for purchasing a product manufactured by Marks 4WD Adaptors. The following instructions are intended as a guide only. We recommend that you purchase service manuals pertaining to your vehicle and donor engine for specific torque values, wiring diagrams and other related information. If you have, any further questions that are not covered in this instruction sheet please feel free to call our technical support department for further assistance.

Please note; we have manufactured a number of kit components to make the installation as easy as possible. It is not a requirement to purchase all of these kits as you may have the resources to make some of them yourself. However the following instructions cover all of our installation kits.

NOTE: The bellhousing is designed to accept the manual Commodore starter motor, this starter is manufactured by Delco in the USA. The starter motor from an engine fitted with an automatic transmission will not fit the bellhousing, this unit is manufactured by Bosch. Marks 4WD Adaptors stock the genuine Delco starter motors, which have been designed to suit the conversion bellhousing, our starter part no. MFK1480.

VEHICLE PREPARATION

1. Remove the bonnet from the vehicle. **NOTE:** It is recommended that you mark the position of the hinges on the bonnet to aid alignment when refitting after the conversion is completed.
2. Disconnect and label all wiring attached to the engine. This will make it easier to identify wires at a latter stage. **NOTE:** The following is a suggested list of wires to identify.

Tachometer	Ignition B+	Oil Pressure	Water Temperature	A/C Clutch
Charge (ignition) Light		Starter Solenoid		

3. Disconnect the battery.

4. Drain the engine oil and coolant from the engine and remove the radiator and heater hoses.
5. Remove the radiator and fan cowl.
6. If your vehicle is equipped with air conditioning, evacuate the old gas from the system and disconnect the hoses from the compressor.
7. If your vehicle is equipped with power steering, disconnect the hoses attached to the power steering pump and steering box and remove the reservoir.
8. Remove the engine exhaust system.
9. Remove the engine mounting nuts and bolts.
10. Lift the front of the engine and remove the engine mounting rubbers.
11. Lower the engine as far as it will go to allow you to remove the top bellhousing bolts.
12. Remove the rest of the bellhousing bolts.
13. Support the transmission using a jack and remove the complete engine assembly using suitable lifting equipment. Do not discard the old engine as some parts from the original engine are still used for this conversion.
14. Degrease the engine bay.

(Engine Mounting) Chassis Preparation

15. Grind passenger side engine mount post off chassis as this is no longer required. **(all models)**
Vehicles fitted with 3Y or 4Y engines

If you are replacing a **3Y or 4Y engine** you must also **remove the drivers side** Chassis bracket, as the original bracket cannot be used. The new chassis bracket MFC676 (leaf sprung front-end models) & MFC646 (independent front-end models) is supplied in the kit.

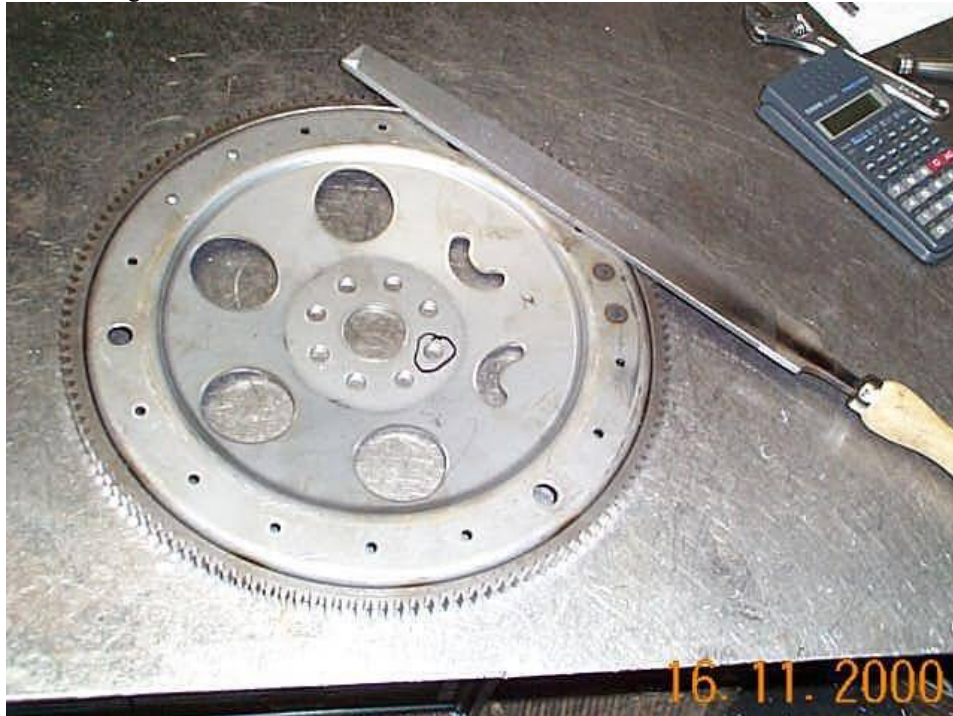
Vehicles fitted with 22R, 2L, 3L and 5L engines

1. If your vehicle is fitted with **independent front suspension**, you must also **remove the passenger side chassis bracket** from the chassis as this is replaced with one supplied the MFK130IFS engine mounting kit. **This modification applies to** all independent front suspension models **both petrol and diesel**.
16. Remove the slave cylinder from the bellhousing.
17. Remove the bellhousing assembly from the transmission.
18. Remove the clutch fork from the bellhousing. Keep the original bellhousing to transmission bolts as they are used to attach the new bellhousing.
19. Thoroughly clean, the gearbox input shaft. Using a piece of emery paper remove any burrs on the shaft spline.
20. Trial fit the input extension shaft onto the gearbox input shaft. It should be an easy slide fit over the spline, if not polish the spline until it does fit easily. You will feel the 12mm spigot go into the pocket inside the extension shaft, if its also tight polish the spigot using emery cloth until it also becomes a slide fit.

21. **NOTE:** The following modification is only required when installing an engine with a rear mounted throttle body as fitted to VN, VP, and VR models.
22. Relocate the heater tap in a higher location on the firewall. Turn it upside down using the same locating tab hole and drill a new mounting hole. Secure it using nutserts and a bolt. Make sure that the cable can still move freely. **NOTE:** This only applies to vehicles being fitted with early VN, VP, VR engines that have the throttle body fitted on the rear of the intake manifold.

MFK1247##
TWO PIECE FLYWHEEL
TO SUIT
HOLDEN VP, VR, VS, AND VT COMMODORE V6 ENGINES

1. Remove the flex plate from the engine.
2. If the flex plate ring gear is worn replace the flex plate. **NOTE:** You must obtain a flex plate specifically for your model engine. The counter weight varies in size according to the particular model of engine.



3. File all burrs off the back of the flex plate to ensure that it fits flat against the back of the new flywheel.
4. Fit the flex plate to the back of the flywheel; use the aligning tool to spigot the two together.
5. Rotate the flex plate to align all of the holes. Secure the flex plate to the flywheel using the three M10 bolts and spring washers supplied in the kit. **NOTE:** Use loctite on the bolts, torque to 20ft-lb or 27n-m.



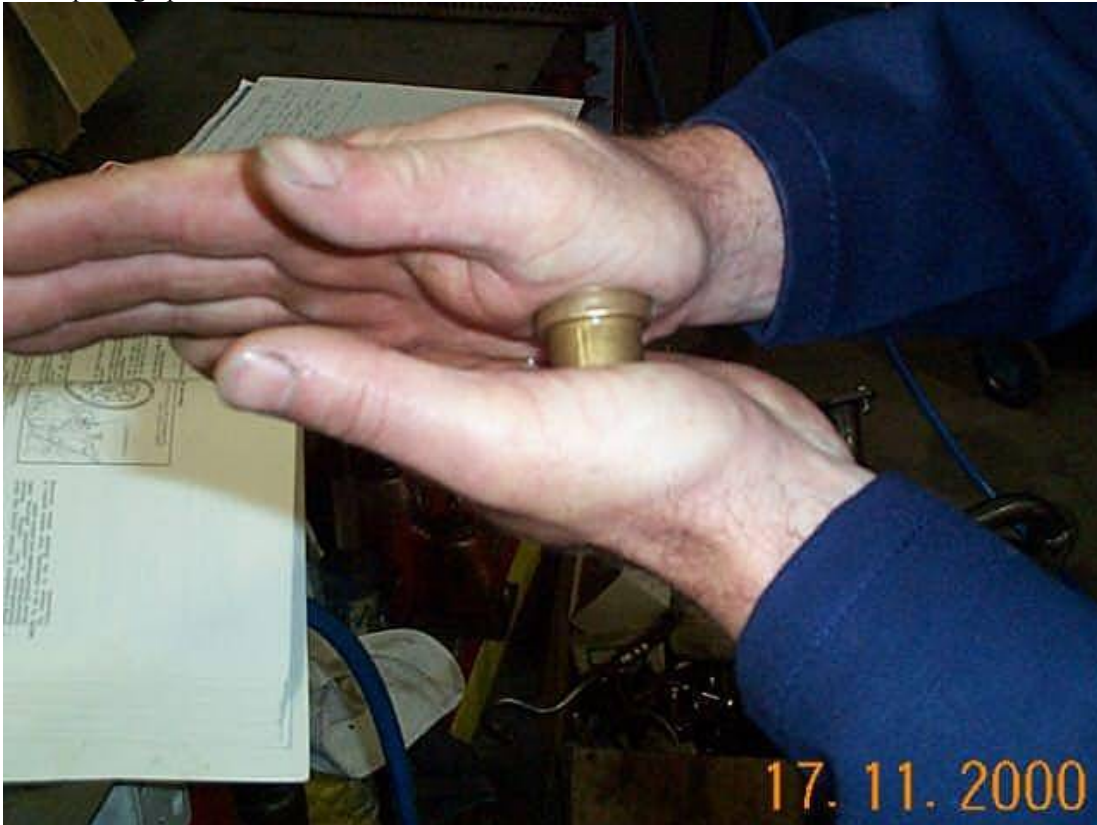
6. Fit the three 1/4" pressure plate-aligning dowels to the flywheel.



7. Fit the flywheel assembly to the engine and secure it using the eight crankshaft bolts supplied.
NOTE: These bolts should be tightened to GM specifications. Please refer to your Commodore

workshop manual. (VP V6 workshop manual states: Torque all bolts to 18-22nm and then tighten a further 70 to 75 degrees turn angle.)

8. Lubricate the spigot bush by filling it with oil and squeezing it from both ends as per the photograph below.



9. Fit the spigot bush in the crankshaft using the special tool supplied.

COMMODORE V6 ENGINE PREPARATION

1. Fit the pressure plate and clutch plate to the flywheel. You must use a standard Holden V6 pressure plate along with a standard Holden V8 clutch plate. The V8 clutch plate used has a stronger centre and is less likely to shutter. The input shaft extension supplied in the kit can be used as a clutch-aligning tool.
2. Take a measurement from the top of the pressure plate fingers to the rear of the V6 block. Two measurements must be taken **Refer to photos.**



The first measurement taken above must be subtracted from the one above.
Write this figure in the following line for later reference.

Clutch finger height = _____ mm



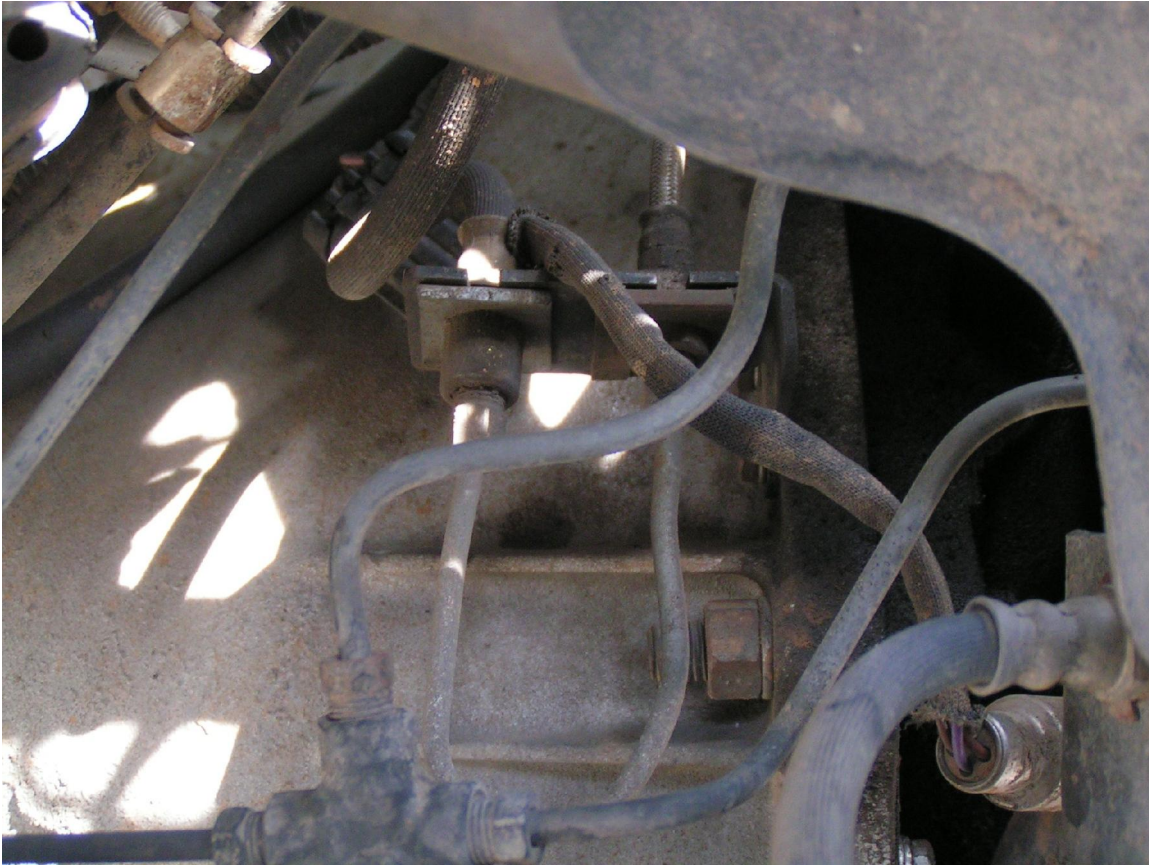
3. Fit the new bellhousing to the gearbox and secure it using the original bolts. **NOTE:** Make sure the 2 dowels are fitted in the front of the gearbox they must be used as they align the gearbox with the engine. Some of the original bolts may need to be cut down to prevent them from bottoming out in the gearbox.

4. Fit the new clutch fork pivot and lock nut to the bellhousing. **NOTE:** The thread may need to be wire buffed some Molly grease on the thread can prevent it from seizing in the housing.
5. Fit the new Toyota clutch fork boot (supplied in the kit) to the bellhousing.
6. Press the thrust-bearing ring (MFC128B) and thrust bearing onto the thrust carrier sleeve (MFC128A) followed by the thrust bearing. **Refer to Photo.**



3. Check to see that the thrust-bearing sleeve slides freely in the bellhousing support boss). If not, clean up any burrs with emery paper. When satisfied that the thrust carrier sleeve slides freely, remove it from the housing and pack the grease groove inside the housing and the sleeve with grease.
4. Grease the clutch fork fingers and pivot. **NOTE:** A clutch fork to carrier spring clip is not required.
5. Fit the clutch fork and thrust bearing carrier assembly to the bellhousing.
6. Fit the slave cylinder to the bellhousing using the original bolts. **NOTE:** The new bellhousing is designed to accept a diesel slave cylinder. If your vehicle was previously fitted with a petrol engine a hydraulic crossover pipe and a new slave cylinder will be required (Part numbers MFK1359R & JB4154) See photos below.





7. The original metal clutch pipe is shortened to make a loop between the Toyota flexible hose and the new stainless hose supplied in the kit. See the photos above.
8. The master cylinder will need to be replaced with a larger bore type, kit part no. MFK1645. Attempting to use a standard master cylinder will result in unsatisfactory clutch operation.
9. Slave cylinder and pushrod notes. **NOTE 1:** Shim the slave cylinder with washers to align the pushrod if required. **NOTE 2:** “WARNING” If the pushrod is at an angle in relation to the centre line of the slave cylinder premature cylinder wear will result. No warranty will be given if the cylinder is worn on one side.
10. Attach the clutch hydraulic line.
11. Push the thrust bearing back as far as it will go and measure the distance between the front of the housing and the front of the thrust bearing. This dimension must be 5mm more than the distance measured previously and can be adjusted with the clutch fork pivot. Lock the pivot nut against the housing when complete. **Refer to Photo.**



12. **NOTE:** Do not fit the input shaft extension (MFC599) at this stage. This will make it easier to fit the engine to the bellhousing during the engine mount set up procedure.

Water temperature and oil pressure senders

13. VN. Drill and tap the intake manifold near the original V6 temperature sender hole to 1/8"NPF 27tpi thread. Then fit the adaptor (MFK1022) and the original Toyota sender. **NOTE:** The VN series one temp sender is located at the rear of the manifold. The Super charged models are located under the thermostat housing at the rear of the engine, all other models including VN series two have the sender located behind the alternator.
14. VS engines have the water temperature senders located under the thermostat, the large sender on the passenger side is for the ECU and the one on the front is for the gauge. Remove the original Commodore sender on the front and discard it. It has a 1/8"npsf thread. Then fit the adaptor (MFK1022) and the original Toyota sender. See the photograph below.



15. VT and later are only fitted with one temp sender and is located on the passenger side under the thermostat as per the VS one in the photo above. You will have to drill and tap the intake manifold to fit the adaptor supplied in the kit, we suggest fitting it in the same position as the VS. The thread on the adaptor is 1/8" NPSF 27tpi the drill size required for this tap is 8.5mm.
16. If your vehicle is fitted with an oil pressure gauge fit the MFK677 adaptor and fit the Toyota oil pressure sender. **See Photo**



NOTE: The following instruction only applies to VN series one engines with pipe manifolds.

17. Remove the passenger side exhaust manifold, but refit engine lifting bracket. For chassis rail clearance, the outer edge of the lower flange needs to be flattened out using an oxy.

Engine Sump

NOTE: To manufacture these components cutting welding and grinding is required and as these components are associated with the lubrication of your engine we insist that you give them a final clean prior to installation to ensure the longest engine life.

MES768 Engine Sump **HILUX / 4RUNNER**

Leaf Sprung vehicles

Vehicles fitted with VN, VP, VR Engines require no sump modifications, and the original Commodore metal sump is used.

Vehicles fitted with Ecotec Engines will require the alloy sump to be replaced with the steel sump from a VN, VP, or VR Commodore. The GM sump part no. 92061858 and the sump gasket part no. M41479

When fitting the oil pick up tube the brace must be fitted to the main bearing cap bolt.

After fitting check the clearance between the crankshaft and brace as the brace can rotate under the head of the bolt when it is tensioned thus fouling on the crankshaft.

Using the steel sump requires one of the rear holes in the sump to be slotted and also 2 new holes to be drilled and taped in the engine block.

NOTE: Be careful drilling the hole into the aluminium, rear main seal retainer, if you drill too far you will damage the seal.

The Early model VR dip stick and dipstick tube must be used with this metal sump. Part numbers for the VR dipstick is GM 92032567, Dipstick tube GM 92061425, o'ring GM 25534689. The old tube in the block should be removed. **NOTE:** Plug the hole in the block after removing the tube.

IFS vehicles

Vehicles fitted with VN, VP, VR Engines use Marks 4WD Adaptors sump and pickup part no. MES768 with gasket part no. M41479

When fitting the oil pick up tube the brace must be fitted to the main bearing cap bolt.

After fitting check the clearance between the crankshaft and brace as the brace can rotate under the head of the bolt when it is tensioned thus fouling on the crankshaft.

Vehicles fitted with Ecotec Engines will require the alloy sump to be replaced with a new sump and pickup from Marks 4WD Adaptors part no. MES768 with gasket part no. M41479

When fitting the oil pick up tube the brace must be fitted to the main bearing cap bolt.

After fitting check the clearance between the crankshaft and brace as the brace can rotate under the head of the bolt when it is tensioned thus fouling on the crankshaft.

Using the steel sump requires one of the rear holes in the sump to be slotted and also 2 new holes to be drilled and taped in the engine block.

NOTE: Be careful drilling the hole into the aluminium, rear main seal retainer, if you drill too far you will damage the seal.

The Early model VR dip stick and dipstick tube must be used with this metal sump. Part numbers for the VR dipstick is GM 92032567, Dipstick tube GM 92061425, o'ring GM 25534689. The old tube in the block should be removed. **NOTE:** Plug the hole in the block after removing the tube.

Engine Mounting

Note 1: If you are having problems fitting your engine mounts, try rotating them 180 degrees as the engine mounting rubber stud is not on centre. This can effect the overall width and hight of the engine.

Note 2: When the engine is fitted you will notice that it is offset toward the driver side this is to help with exhaust clearance.

Next operation is to find the exact engine mounting location. The most accurate way to position the mountings is to fit the engine. As there are a number of different chassis mountings, we have separated them as follows:

3.1 Vehicles with leaf spring front suspension previously fitted with 2.2, 2.4 and 2.8ltr diesel and 18R, 22R petrol engines. Kit part no. MFK130

(i). Attach the drivers side engine bracket to V6 engine (part no. MFC131 or MFC 1213) as supplied with the engine mounting kit. This engine bracket utilises the standard Hilux engine mounting rubber and chassis post.

(ii). Make sure the Commodore V6 engine has the relevant passenger side GM engine-mounting bracket fitted. If the engine is not equipped with air conditioning a steel bracket will be fitted to the engine, if air conditioning is fitted the bracket is an aluminium one. Bolt the GM rubber to the bracket on the engine block.

Differential Stabaliser.

Note: If you are fitting an Ecotec engine you will need to remove the front diff stabilizer bracket from the chassis rail and relocate it forward away from the oil filter.

See The Photo Below

1. Remove the stabaliser shaft.
2. Cut the shaft in two places 50mm from the bush on each end.
3. Using a length of pipe 350mm long with the same internal diameter as the shaft, slide the previously cut shaft ends into each end of the pipe.
4. Line up the bushes to make them parallel and weld them in place.
5. Paint the extended shaft.
6. Cut the bracket off the chassis using a 9" grinder with a cut off wheel fitted.
7. Fit the shaft to the diff and the bracket.
8. Hold the bracket against the chassis and mark its position.
9. Lower the bracket and grind the paint off the chassis.
10. Hold the bracket in position and weld it in place.
11. Paint the bracket and chassis.
12. The stone guard will also have to be modified if you intend reusing it.



13.The engine is now ready to be trial fitted so that the exact position of the passenger side chassis bracket can be found.

14.Proceed to instruction 4.



3.2 Vehicles with leaf sprung front end previously fitted with 3Y or 4Y petrol engines. Kit part no. MFK130P

- (i). Attach the drivers side engine block bracket (part no. MFC131) as supplied with the engine mounting kit. This engine mount bracket utilises the standard Hilux engine mount rubbers. Remove the chassis post from the driver side, chassis rail.
- (ii). Make sure the Commodore V6 engine has the relevant passenger side GM engine-mounting bracket fitted. If the engine is not equipped with air conditioning a steel bracket will be fitted to the engine, if air conditioning is fitted the bracket is an aluminium one. Bolt the GM rubber to the bracket on the engine block.

Differential Stabiliser.

Note: If you are fitting an Ecotec engine you will need to remove the front diff stabilizer bracket from the chassis rail and relocate it forward away from the oil filter.

See the previous page

- (iii). The engine is now ready to be trial fitted so that the exact location of the passenger side chassis bracket (MFC130) and drivers side chassis post (MFC676) can be located.
- (iv). Proceed to instruction 4.

3.3 Vehicles with independent front suspension previously fitted with, 2.4 and 2.8ltr diesel or 22R petrol engines. Kit part no. MFK130IFS

- (i). Attach the drivers side engine bracket (part no. MFC131) as supplied with the engine mounting kit. This engine mount bracket utilises the standard Hilux engine mounting rubber and chassis post.
- (ii). Make sure the Commodore V6 engine has the relevant passenger side GM engine-mounting bracket fitted. If the engine is not equipped with air conditioning a steel bracket will be fitted to the engine, if air conditioning is fitted the bracket is an aluminium one.

Bolt the engine mount adaptor bracket (MFC685) to the original GM bracket. You will have to remove the A/C Pump to gain access to the 4 holes. Using the new bracket supplied as a jig drill the other two holes. This adaptor is a wedge shape and adapts the GM bracket to the original Hilux engine mounting rubber. The passenger side, chassis post consists of a top plate (MFC686) rear gusset (MFC687) and front gusset (MFC688). These parts need to be assembled when the engine is trial fitted.

Details for the assembly of the passenger (left hand) side mount are shown in the photos below.



- (iii). Fit the steering damper relocation kit. *See MFK771 fitting instructions below.*
- (iv). Proceed to instruction 4.

3.4 Vehicles with independent front suspension previously fitted with 3Y or 4Y petrol engines. Kit part no. MFK130IFSP

- (1). Remove the chassis post from the driver side, chassis rail.

(1A). Attach the driver side engine bracket, (MFC1213) to the engine. This engine-mounting bracket utilises the standard Hilux engine mounting rubber along with the new chassis post (MFC646).

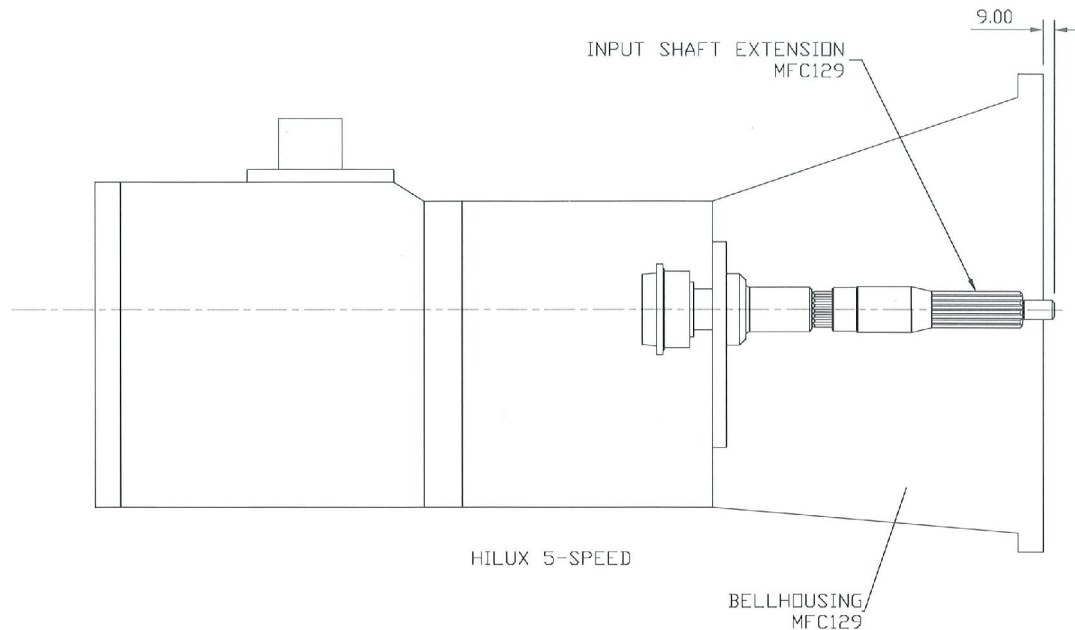
- (ii). Make sure the Commodore V6 engine has the relevant passenger side GM engine mount bracket fitted. If no air conditioning is to be fitted then it is a steel bracket that is fitted to the engine, if air conditioning is to be fitted the bracket is aluminium.

Bolt the engine mount adaptor (MFC685) to the original GM bracket. You will have to remove the A/C Pump to gain access to the 4 holes. Using the new bracket supplied as a jig drill the other two holes. This adaptor looks like a wedge and adapts the GM bracket to the original Hilux engine mounting rubber. The passenger side, chassis post consists of a top plate (MFC686) rear gusset (MFC687) and front gusset (MFC688). These parts need to be assembled when the engine is trial fitted.

- (iii). Fit the steering damper relocation kit. *See MFK771 fitting instructions below.*

Instruction 4

1. Lower the engine into the engine bay and bolt it to the bellhousing. Position the engine mounting bracket(s) over the chassis rails. Once satisfactory positioning is achieved tack weld the chassis bracket(s) into place.
2. Remove the engine and complete the welding of all the brackets.
3. Paint the welded area.
4. Place a light smear of grease on the input shaft spline and fit the input shaft extension (MFC599) using a soft-faced hammer. **WARNING!** Don't put any grease in the 12mm pocket at the end of the spline. This will prevent the shaft from fitting all the way on the input shaft, and could damage the engine or gearbox bearings. **NOTE:** Check the distance that the input shaft is protruding from the front of the bellhousing it should be 9mm +/-2mm. See the following diagram.



STEERING DAMPER RELOCATION KIT **MFK771**

FITTING INSTRUCTIONS

This kit has been designed to relocate the steering damper from above the track rod to the lower side. The brackets have also been designed to allow the fitting of larger after market steering dampers. **NOTE:** If you have a post 1998 model the steering damper bracket will not look like the one in the photograph. The saddle bracket that comes from behind the track rod is on the opposite side to the one shown below.

1. Remove the steering damper.
2. Remove the damper chassis bracket from the chassis.

The following instruction suits 4-cylinder Hilux and 4/Runner.

3a. Fit the MFC772A bracket to the front of the track rod where the steering damper was located. The 2 welded bosses face the rear of the vehicle with the small one at the top. Secure it to the track rod using the 1/2"unc x 2" bolt (MFC785) and nylock nut (MFC786). **NOTE:** The bolt must be fitted from the rear through the track rod and then the bracket, do not tighten the bolt at this stage.

The following instruction suits the V6 4/Runner.

3b. Fit the MFC772A bracket to the front of the track rod where the steering damper was located. The 2 welded bosses face the rear of the vehicle with the small one at the top. **NOTE:** The small boss on the top of the bracket may need to be removed to allow the bracket to fit flat against the track rod.

Secure it to the track rod using the 1/2"unc x 2" bolt (MFC785) and nylock nut (MFC786). **NOTE:** The bolt must be fitted from the rear through the track rod and then the bracket, do not tighten the bolt at this stage.

4. Fit the MFC772D saddle over the track rod from the rear, secure it to the damper bracket using the 2 M8x1.25x25 counter sunk SHCS, 2 flat washers (MFC069), 2 spring washers (MFC438) and 2 M8 nuts (MFC068).

5. Tighten the 1/2" nylock nut and the 2 M8 nuts.

The following photo shows the bracket installed in a V6 4/Runner fitted with a Commodore V6.



6. Fit the steering damper to the track rod bracket from the front and secure it with the original nylock nut.

7. Fit the damper chassis bracket (MFC771) to the other end of the damper with the folded side facing up.

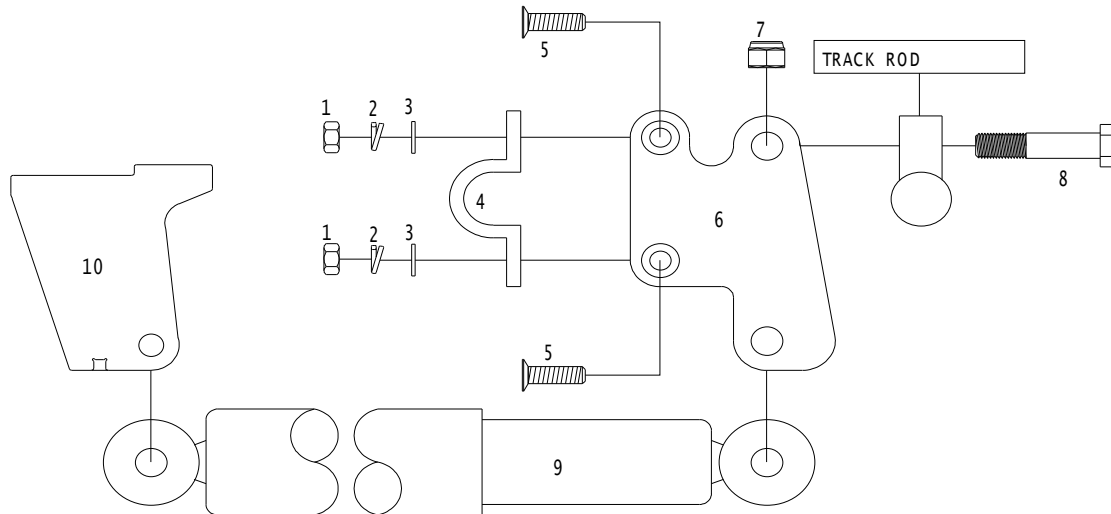
8. This new bracket is welded to the front wishbone-mounting bracket. ***NOTE:*** The notched out side of the bracket fits over the raised section of the wishbone-mounting bracket. It will run parallel to the chassis rail facing the front of the vehicle and the steering damper will be parallel to the track rod. Remove all of the paint from the area to be welded.

9. Tack weld the bracket to the chassis and remove the damper.

10. Complete the welding and allow it to cool before painting.

11. Refit the steering damper to the chassis bracket.

12. Double check all of the bolts are tight.



No.	PART DESCRIPTION
1	NUT M8X1.25
2	WASHER SPRING M8
3	WASHER FLAT M8X20
4	SADDLE, BRACKET TO TRACK ROD.
5	SOCKET HEAD CAP/SUNK M8X1.25X25 LONG.
6	BRACKET, DAMPER TO TRACK ROD.
7	NUT 1/2" UNC NYLOCK.
8	BOLT HEX HEAD 1/2"x2" UNC 8.8
9	STEERING DAMPER
10	CHASSIS BRACKET- STEERING DAMPER

Final Installation

1. Lower the engine into the engine bay and put the transmission in 4th gear and the transfer case in high range. Jack one of the rear wheels off the ground and rock it backward and forward to align the gearbox, input shaft with the clutch plate.
2. Bolt the engine to the bellhousing using the bolts supplied. Make sure that you use the correct length bolts, the R/H bottom bolt is a through bolt with a spring washer and nut. The L/H one is a socket head cap screw and the rest is easy.

Fasten the engine mounts using the correct nuts and bolts.

Check the Clutch Operation

1. Bleed the clutch system and check the clutch operation. With the back wheel off the ground and the gearbox in fourth gear, depress the clutch pedal and rotate the back wheel by hand. If the clutch does not work, fix the problem before proceeding. **NOTE:** Some vehicles may need to have the clutch pedal height adjusted to obtain proper clutch operation.

Clutch Pedal Height Adjustment

2. There is a pedal height stop, which needs to be raised first, then adjust the master cylinder push rod.
3. When the correct height is found lock the pedal stop and adjust the push rod so that there is a small amount of free play this will prevent the system from building up pressure and causing premature clutch pressure plate and thrust bearing failure.

Flywheel Cover Plate

1. Fit the bellhousing flywheel cover plate (MFC601) to the front of the bellhousing using the three 6mm bolts, flat washers, and spring washers supplied. **NOTE:** For correct fitting around the sump the cover plate may need to be modified to fit over the flange on the back of the sump.
2. Seal around the cover to the engine using silastic.

Earth Strap Connection

1. Attach the original Toyota firewall earth strap to one of the bolts on the back of the manifold.
2. Fit the new earth strap supplied in the interface wiring loom kit to a bolt near the DFI module, coil pack and onto the inner mudguard. **NOTE:** Remove the paint where the earth strap is to be fitted or use a star washer to ensure a perfect connection.

Diesel and leaded Fuel System Changes

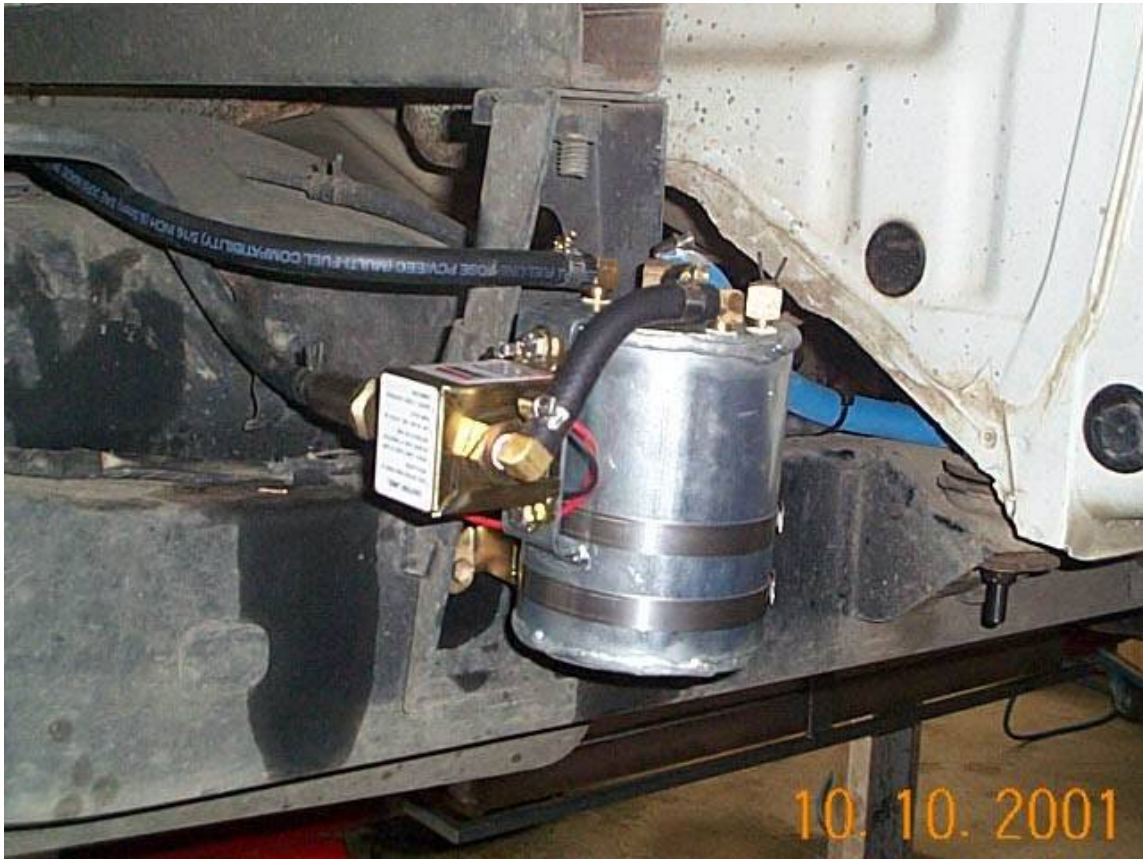
1. If your vehicle originally ran on either super (Leaded) grade petrol or diesel:
2. Drain the fuel tank. Remove bash pan under fuel tank if required.
3. Remove the filler neck from fuel tank.
4. Cut the original filler neck near the top and weld in a ULP restrictor flap.
5. Re-weld the filler neck, paint and refit it to the vehicle.
6. Alternatively, fit a complete new ULP filler neck from a petrol model vehicle.
7. Affix " **UNLEADED FUEL ONLY** " sticker to the inside filler cap access door.
8. Reinstall the fuel tank drain plug and bash pan if required.

Fuel Pump System

NOTE: The fuel hose supplied in the following kits is special high pressure EFI hose and should not be substituted with hose having a lower pressure rating.

1. Fit the low-pressure lift pump to the bracket on the side of the surge tank using the two M6x10 stainless bolts and spring washers.
2. Fit the filter, supplied with the pump to the intake side of the pump (the side with the long snout).
3. Fit one of the 90 degree 5/16" barb fittings in the outlet of the pump facing the top of the surge tank.
4. Fit the surge tank on the side of the chassis rail near the fuel tank with the fuel pump inlet facing the fuel tank. Secure it using the bracket, hose clamps and bolts supplied.
5. Fit the pickup with the 1/2" outlet into the top of the surge tank with the outlet facing the front of the car where the high-pressure pump is going to be mounted.
6. The two holes that are close together in the top of the tank require two 90-degree fittings to be fitted.
7. First use another one-piece fitting and face it to the front of the vehicle as per the 1/2" outlet.
8. Second use the two piece fitting and face it toward the outlet of the lift pump. Use a short piece of 5/16" fuel hose and two clamps to connect them together.

9. Fit the last 90-degree fitting facing the fuel tank. This is the return back to the fuel tank. Connect the original rubber return line to this fitting.
10. Connect the original rubber fuel supply line to the inlet of the lift pump.
11. Connect the return line from the engine to the 90-degree fitting facing the front of the vehicle. **See Photo**



12. Fit the new high-pressure fuel pump (supplied in the kit) to the fuel pump mounting bracket part no. MFC684 & MFC683. Make sure the rubber-insulating sleeve is fitted to fuel pump. Fit the assembly to the inside of the chassis rail. Secure it using the nuts and bolts supplied. Make sure the fuel pump earth wire is connected to a mounting bolt that will provide a good earth. **See Photo Important Note : The EFI fuel pump supplied must only be used with a 12mm or 1/2" pick up line from the tank or a surge tank as described above .**

13. Fit the new fuel filter using the bracket part no. MFC682, the 46-70 mm hose clamp, and screws supplied. It must be mounted after the high-pressure pump. **NOTE:** The filter must be facing the correct way, check the direction label on the side of the filter.



14. Connect the 1/2" surge tank outlet to the inlet of the high-pressure fuel pump using the hose and clamps supplied in the kit.
15. Connect the outlet of the high-pressure pump to the inlet of the high-pressure filter using the fuel hose and clamps supplied in the kit.
16. Connect the outlet of the high-pressure fuel filter to the fuel rail on the engine using the hose and clamps supplied in the kit. **NOTE:** Use cable ties to secure the hose away from the front drive shaft and any heat.

Fuel Purge System

NON Ecotec Engines

1. **Diesel and Petrol application.** Fit the GM carbon canister to the front, driver side corner of engine bay. Secure it using the bracket part no. MFC678, bolts, washers, and 107 mm hose clamp supplied in the kit.

2. **Diesel application.** The Toyota tank breather hose is normally tucked into the chassis just near the filler neck, pull this hose out and join another hose to it and run it back to the engine bay. Secure it with cable ties along the chassis. This hose is connected to the GM vapour canister.
3. **Petrol application.** Connect the Toyota tank breather hose to the large fitting in the centre on top of carbon canister.
4. **Connect** the top fitting on the carbon canister to the vacuum port on the throttle body.
5. **Connect** the purge hose from the engine manifold to the carbon canister.

Ecotec Engines

6. **Diesel application.** Fit the GM carbon canister to the rear, passenger side corner of engine bay. Secure it using the bracket part no. MFC678, bolts, washers, and 107 mm hose clamp supplied in the kit.
7. **Diesel application.** The Toyota tank breather hose is normally tucked into the chassis just near the filler neck, pull this hose out and join another hose to it and run it back to the engine bay. Secure it with cable ties along the chassis. This hose is connected to the GM vapor canister.
8. **Petrol application.** Use the Hilux 22R carbon canister if it is fitted to the rear passenger side corner of the engine bay. If not fit the bracket part no. MFC678, bolts, washers, and 107 mm hose clamp supplied in the kit.
9. **Connect** the purge hose from the purge solenoid to the carbon canister.

Map Sensor Non Ecotec

1. Fit the MAP sensor to the firewall near the throttle body, using the bracket part number MFC797 and the two self-taping screws supplied.

NOTE: The following instruction only applies to VN series one engines.

15. Fit the radiator purge tank to the RH inner guard. Connect the overflow hose to the tank, and run the hose along the driver side, inner guard and across the front just under the bonnet line. Secure the hose with cable ties. **NOTE:** On some models relocation of the fuse box may be required to clear the purge tank. If this modification is required then the fuse box needs to be rotated 90 degrees. Two new brackets will need to be fabricated to hold it in its new location.

Engine Vacuum for Brakes

WARNING Vacuum hose must be used for this application. If any other hose is used as a substitute, brake failure will result.

1. **Diesel models.** If room permits leave the original Toyota vacuum tank in the vehicle as it is fitted with a non-return valve.
2. Fit a piece of new vacuum hose between the vacuum port on the throttle body (non Ecotec) or intake manifold (Ecotec) and the barb fitting on the tank, use hose clamps to secure the ends.

Power Steering

Non Ecotec Engines

1. If your vehicle is equipped with power steering, a new high-pressure hose will need to be fabricated. The GM hose can be used if it fits the Toyota fitting on the Steering box end.
2. The original Toyota return hose can be reused.

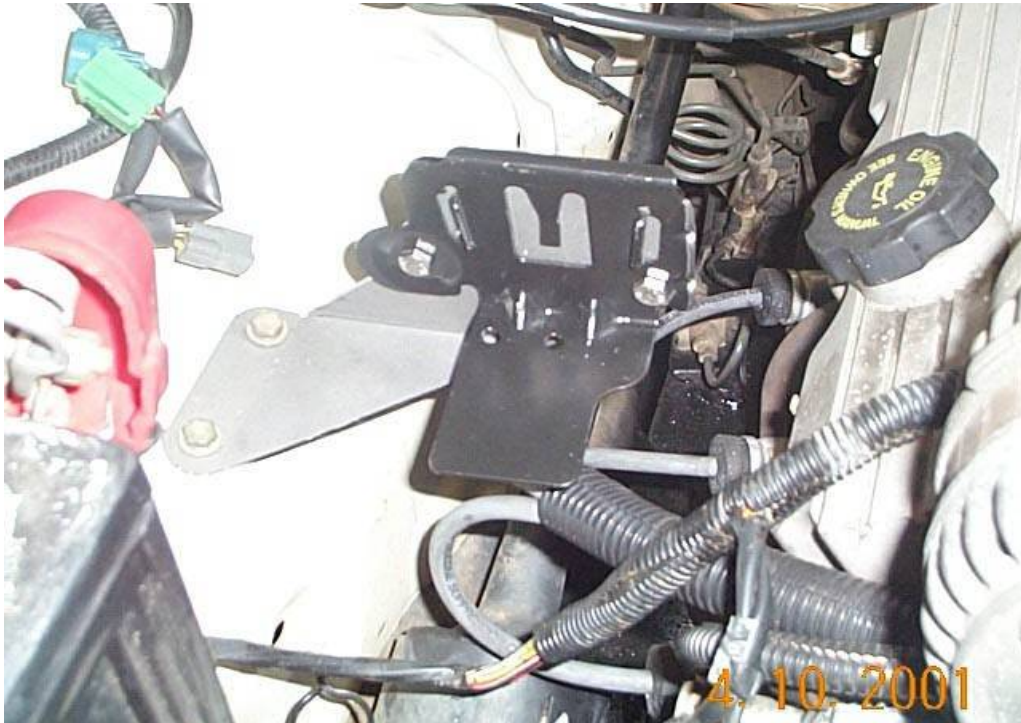
Ecotec Engines

1. If your vehicle is equipped with power steering, a new high-pressure hose will need to be fabricated. The GM hose can be used if it fits the Toyota fitting on the Steering box end.



2. If you are using an Ecotec engine you will need to mount the power steering reservoir to the inner guard you can fabricate your own or use Marks 4WD Adaptors part No. MFK1464 bracket kit.
3. To use Marks 4WD Adaptors bracket you will also need to purchase the original GM bracket part No. 92055247.

4. Fit the GM bracket to the MFC1464 bracket using one of the M6 bolts, spring washers and nuts supplied in the kit.
5. Line up the fold in the top of the GM bracket, with the top edge of the MFC1464 bracket and tighten the bolt.
6. Using the MFC1464 as a drill jig. Drill the second hole through the GM bracket and secure them with the other M6 bolt, spring washer, and nut supplied in the kit.
7. Cut the GM bracket where it extends past the edge of the MFC1464 bracket. (engine side)
8. Paint the cut edge of the GM bracket.
9. Late model 22R vehicles where fitted with a carbon canister near the carburetor and was secured to the guard by two M6 bolts. These two bolts are used to secure the power steering reservoir brackets to the inner guard.
10. Other models may require two holes to be drilled through the inner guard along with two M6 bolts spring washers and nuts to secure the brackets. *See Photo*



11. Fit the supply hose to the power steering pump and the reservoir and secure the ends with hose clamps.
12. Fit the return pipe end in the steering box facing the front of the vehicle.

13. Fit the return hose to the pipe end and the reservoir. Secure the ends using hose clamps.

Accelerator Cable

NOTE: The GM cable used in the following instruction is part No. 92049433 for Ecotec, 92055520 for SII engines

1. Remove the Toyota accelerator cable from the firewall.
2. Then remove the old Toyota cable end parts and modify them by cutting a slot through the side to allow them to slide over the side of the GM cable. **See Photos**



3. TI



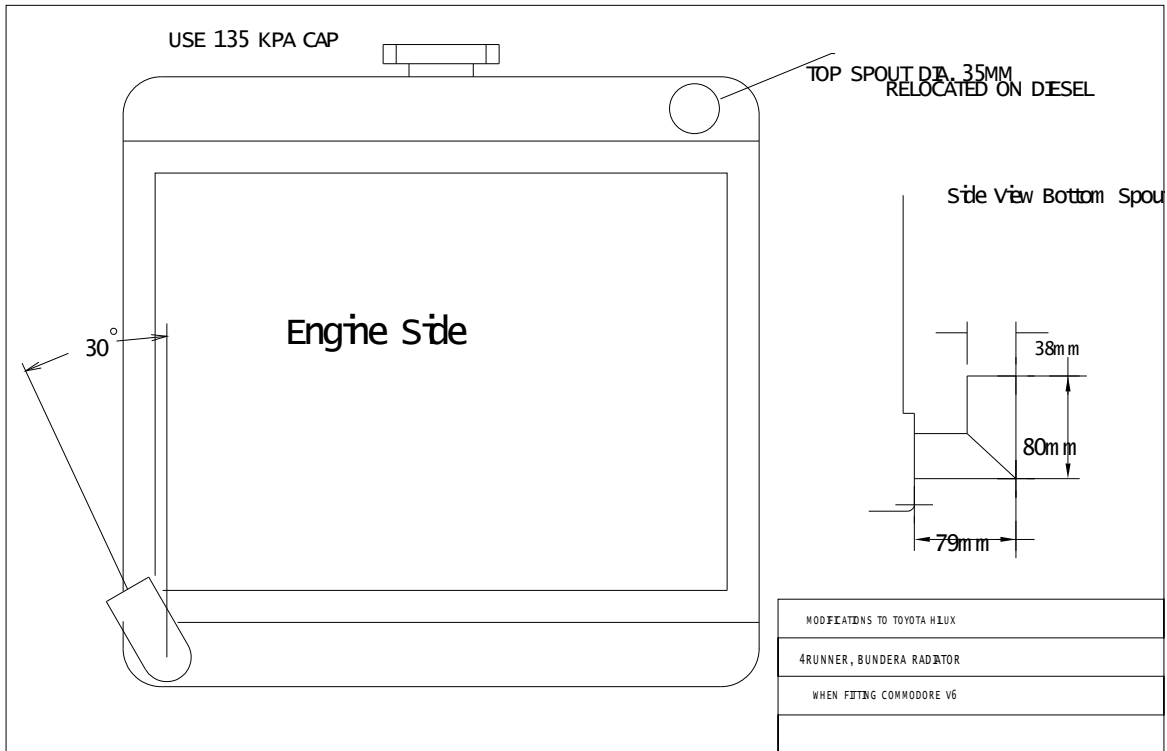
3. Using a file enlarge the hole in the firewall to allow the Holden outer cable end (shown above) to fit freely.
4. Remove the accelerator pedal assembly and re-drill the hole where the cable end locates to 9.5mm. Remove the burrs and chamfer the rear side of the hole to allow the plastic fitting to compress easily.
5. Place the pedal assembly in the vice and bend the top section above the pivot point to place the end hole approximately an extra 35mm away from the fire wall. This is required to take up the extra slack in the inner cable. **See PhotoBelow**



Radiator

The 2-row Hilux petrol radiator is not big enough to keep the V6 engine cool, a 3-row radiator from a diesel is a minimum requirement. For extreme conditions our custom 4-row radiator is recommended, part no. MFK1249

1. Fit the modified radiator and secure it using the original bolts. **See the diagram below.**



Engine Driven Cooling Fan

1. Release the tension on the drive belt and remove it from the pulleys.
2. Remove the water pump pulley.
3. Fit the steel pulley to the water pump. Secure it using the socket head, cap screws and spring washers supplied in the kit.
4. Refit the serpentine belt.
5. Fit the fan adaptor to the front of the new water pump pulley and secure it using the socket head cap screws and spring washers supplied in the kit.

IMPORTANT NOTE: SHOULD YOU BE ATTEMPTING DEEP WATER CROSSINGS WE RECOMMEND THAT YOU REMOVE THE FAN DRIVE BELT AS THE FAN BLADES DEFLECT CAUSING RADIATOR DAMAGE.

Engine Driven Cooling Fan **Fan Shroud**

NOTE: We now manufacture a fan shroud for the 2.8ltr diesel models that is completely finished ready to bolt in. When fitting the shroud to a 2.4ltr diesel radiator modifications will be required as the radiator core in this model is shorter. The Part Number MFK1416DA is shown in the photo below.



Engine Driven Fan
Fan Shroud Kit

1. Fit the fan cowling to the radiator and secure it using the top two mounting bolts.
2. Fit the fan to the water pump pulley with the fan ring as per the following photo.
3. The fan ring is 40mm diameter larger than the fan this will allow 20mm clearance all round.
4. If you have a high performance engine I recommend 25 to 30mm clearance on the driver side to allow for the engine torque twisting to that side.
5. Using a pen mark the fan ring position on the back of the fan cowling.

6. Remove the fan, cowling and ring from the vehicle.
7. Lay the fan cowling, radiator side down onto a flat bench. Align the fan ring to the back of the fan cowling with the tack-welded join on the bottom. Mark the back of the fan cowling with a pen, using the inside edge of the ring as a guide. See photo below.
8. Cut the centre out of the fan cowling using a jigsaw. **NOTE:** don't cut through the folded edge at the top of the cowling. See photo below.





5. Tack weld the fan ring to the back of the cowling.
6. Take the piece of metal off cut previously cut out of the centre of the cowl and position it inside the ring. Using a pen mark the metal off cut where it meets with the folded edge at the top of the cowl.
7. Using a jigsaw cut the small part moon shape from the off cut.



8. Using a jigsaw cut the small part moon shape from the off cut.
9. Tack weld the newly cut piece into position.
10. Complete the welding. **NOTE:** I welded the entire inside edge of the ring but it's not necessary to do so, a number of small welds will suffice.
11. The join at the bottom of the ring should be welded on the outside face so that the inside face can be free of lumps and bumps this will allow a little more clearance for the fan.
12. Using a grinder or sanding disc clean and smooth all of the sharp edges.
13. The cowling is now ready for painting or powder coating.
14. Fit the cowling to the radiator and the fan to the engine. **NOTE:** The fan is marked "Radiator side". Place this side toward the engine.

Electric Cooling Fans and Hoses

Kit part no. MFK1201 (Non Ecotec) and MFK1201E (Ecotec)

1. Fit the electric fans to the new mounting bracket, and secure them using the bolts, washers and nuts supplied in the kit.



2. Fit the fan assembly to the back of the radiator and secure it using the original Toyota, fan shroud bolts.

3. The bottom radiator needs to be cut down at the radiator end. Put the hose in position and mark the hose for correct length.
4. Put the hose in a vice and cut it with a hacksaw.
5. Fit the hose to the radiator and water pump and secure it using the hose clamps supplied in the kit. **NOTE:** To make the hoses fit easily spray inside the ends with a small amount of CRC.
6. Fit the top radiator hose and secure it using the hose clamps supplied in the kit.

Heater Hoses

Heater Hose kit part no. MFK1507

Non Ecotec Engines

2. Connect the 90-degree end of the new heater hose to the tap and secure it with a hose clamp supplied. **NOTE:** The short straight section may need to be cut down to reduce the pressure on the bend.
3. Connect the other end to the top stainless water outlet on the front of the engine.
4. Connect the 90-degree end of the other hose to the heater pipe protruding from the firewall and secure it with the hose clamp supplied. **NOTE:** The short straight section may need to be cut down to reduce the pressure on the bend.
5. Cut the hose so that it will connect to the plastic fitting (water outlet) at the rear of the intake manifold.

Ecotec Engines

6. Connect the 90-degree end of the new heater hose to the tap and secure it with a hose clamp supplied. **NOTE:** The short straight section may need to be cut down to reduce the pressure on the bend.
7. Connect the other end to the top stainless water outlet on the front of the engine.
8. Connect the 90-degree end of the other hose to the heater pipe protruding from the firewall and secure it with the hose clamp supplied. **NOTE:** The short straight section may need to be cut down to reduce the pressure on the bend.
9. The front water outlet on the engine is larger than the hose supplied in the kit. For this reason you will need an original GM hose to use as a reducer.
10. Cut the GM hose 150mm from the engine end and fit the 5/8" joiner, secure it using one of the hose clamps supplied in the kit.

11. Cut the access hose off the end of the hose that comes from the heater and fit it to the joiner; secure it using one of the hose clamps supplied in the kit.
12. Fill the radiator and engine with coolant. The total capacity is about 10ltr plus depending on the radiator used. You will need to put some antifreeze anti boil inhibitor in to the system the amount is about 4ltr as recommended by GM.

Air Cleaner System

Using the Toyota Air Cleaner

1. If your vehicle is fitted with a snorkel we recommend you keep it and plumb the engine to the Toyota air cleaner.
2. To do this you could use a rubber reducer or a metal reducer to adapt down from the throttle body or mass air flow meter to the Toyota air cleaner. Or alternately you could fit a larger air outlet pipe to the air cleaner and use all GM fittings to the engine.



Using the GM Air Cleaner

1. Fit the GM air cleaner assembly behind the headlight.
2. You will need to drill through the inner guard and use some M6 bolts, washers, and nuts to secure it.
3. Plumb the air cleaner to the engine using the original GM air ducting parts.



Exhaust System

NOTE: 1 If you are fitting a VT engine and are having problems fitting the right hand manifold we suggest using one from a VS model. VT engines are fitted with cast iron manifolds as are VS engines however the right hand manifold on a VT engine is much wider than the manifold on a VS engine.

A professional exhaust fitter can manufacture the exhaust system, however it can also be built by most general work shops using mandrel bends, flange joiners and the necessary catalytic converter and muffler.

The photo shows a hand built mandrel exhaust system ready for installation.

The engine pipes were made using 2" mandrel bends.

The catalytic converter and Collector are second hand and were purchased with the engine. As it was purchased as a complete engine pipe set it also came with the manifold flanges fitted.

The system after the catalytic converter was made using 2 1/4" pipe and mandrel bends.

An exhaust fitter previously made the tail pipe.



Final Checks Before Starting And Road Testing

13. Check all fluid levels and fill fuel tank with unleaded fuel.
14. Start the engine and check for-
 - Fuel leaks.
 - Oil leaks.
 - Water leaks.
 - Exhaust leaks.Allow to warm up and recheck above.
15. Refit the bonnet.
1. Road test vehicle for at least 20 kilometres and re check for any leaks.

Air Conditioning System

4. If your vehicle is equipped with air conditioning, a pair of new hoses will require fabrication to connect the Toyota air conditioning components to the GM air conditioning compressor.
- 2.

Trouble shooting

1. Injector Noise.

Cause - All injectors close at once sending pulses back through the fuel line. More noise in cab than under the hood.

Possible fixes -Adjust the fuel Damper located at fuel the pump. (Early models only)
Relocate Damper on firewall. (Early models only)
Add 18" fuel hose between fuel rack and fuel filter.
Rubber mount fuel filter.
Rubber mount fuel pump.
Isolate fuel feed lines off body.

2. Knocks in exhaust system.

Cause - Vehicle has been run on super grade petrol.

Remedy - Change O2 sensor.

3. Fan does not operate.

Check - Wiring at relay.
Fuse

If correct relay is used.

4. *Engine overheating.*

Check - Fan operation.

Check - Direction of fan, could be wired back to front or fan could be on backwards.

5. *Battery goes flat.*

Check - Turn ignition off and disconnect the battery and then reconnect the battery.

Listen for relays clicking. If they do then the wiring is wrong. Re check the wiring.

6. *Poor fuel economy and erratic idle quality*

Cause - For the Commodore ECM to function properly it relies on information derived from external sensors that give vital information to the ECM. One vital piece of information is obtained through the original Vehicle Speed Sender (VSS).

The VSS provides an indication of road speed to the ECM. The sender is an electronic Hall switch which sends information to the ECM via the dashboard circuit. This information is used by the ECM to determine when to operate the torque converter clutch, and to vary the fuel delivery according to certain conditions.

If the ECM receives no pulses on its vehicle speed input while certain conditions exist, a Code 24 will set inside the ECM. This will result in increased fuel consumption, poor idle quality and lack of torque converter clutch operation when fitted in conjunction with the TH700R-4 automatic transmission.

Remedy - Marks Vehicle Speed Sensor Interface Part No. MFK 696.

The VSS is vital to correct operation for the following functions:

The GM ECM has provision in its program for fuel shut off during deceleration. This is achieved by the ECM cutting off the fuel pulses for short periods of time when the vehicle is in motion and is decelerating. The VSS must be in correct operation for this to occur.

The GM ECM has an inbuilt memory where it learns the correct amount of fuel to deliver under certain conditions. The VSS plays a vital role in determining when these conditions occur.

The Commodore automatic transmission has an inbuilt Torque converter clutch which reduces the efficiency loss of the automatic transmission by manually coupling the transmission input shaft to the engine flexplate under certain conditions. These conditions are met when the engine coolant temperature is above 42°C, the vehicle speed is above 72km/h, and the throttle is open. Without a vehicle speed reference this function is not possible.

Marks VSS is fitted to the transfer case, where the original speed cable is fitted. The original vehicle speedo cable is then fitted to the rear of Marks VSS. This allows the speedometer to function as original.

Marks VSS sends a signal to the specially programmed module which it interprets into information that the ECM can configure. The module has been set at the factory to take into consideration the vehicles tyre size, final drive ratio and type of ECM being used. Basically the ECM is tricked into believing the engine is still fitted to a Commodore allowing the ECM to function as standard.

The unit itself is very easy to install only requiring three wires to be connected. The unit is supplied with all necessary mounting hardware and full instructions. If at a later stage you decide to change tyre size or the final drive ratio, the unit may be returned to our factory for re programming.

The next photo shows a VS engine installed in a 1994 Hilux.



Clutch Diagnostic Guide

I have tried putting the following in some kind of order however, some of the problems can be related to almost any of the causes. Please consider them all when trying to solve your problem.

Should you have any suggestions or problems not covered in this guide, please feel free to contact us as it could help another enthusiastic four-wheel driver.

Problems

1. Clutch pressure plate hits the adaptor/bellhousing.

2. Clutch plate springs fouls on crankshaft bolts.
3. Clutch rivets foul on flywheel face.
4. Clutch slave cylinder doesn't appear to have enough travel.
5. Slave cylinder push rod travels ok but still doesn't disengage.
6. Clutch disengages at the bottom of the pedal stroke.
7. Clutch pedal low but pumps up.
8. Clutch will not disengage.

Possible causes/remedies for the above.

Key

- 1 Higher or larger diameter than one specified. (Purchase the pressure plate specified in the kit)
- 1 Flywheel higher than specified or used in the kit. (Purchase the correct one)
- 2/3/5/8 Wrong clutch plate. (Purchase the correct one)
- 2 Flywheel machined to many times. (Purchase a new one)
- 2/5/8 Clutch plate wrong way around. (Rotate the facing 180 degrees)
- 2/5/8 Flywheel bolts wrong ones. Heads to high. (Purchase the correct ones)
- 3/5/8 Wrong flywheel. (Purchase the correct one)
- 3/5/8 Wrong clutch and flywheel combination but no alternative. (Machine the flywheel to suit)
8. Clutch plate may be bent (Purchase a new one)
- 4/6/8 Soft slave or master cylinder rubbers, and or hose. Expanding under pressure and not allowing full travel.
- 4/6/8 The input shaft may not be fitted correctly. Eg. Not pushed all the way on, this can exert pressure on the spigot bearing not allowing the gearbox to properly free wheel.
- 4/6 The clutch pedal has excessive free play. (Adjust as per manual)
- 4/5/6 The clutch pedal still has excessive free play after adjusting. (Replace worn parts such as pedal pivot or pushrod pin and/or complete pedal assembly)
- 4/5/6 The clutch pedal can be raised to give more travel. (Adjust the pedal stop and push rod as required)
- 4/5/6 If an input extension shaft was used in the kit make sure that no grease was used in the spigot pocket located in the female end of the shaft. If grease is used hydraulic locking can occur. This will cause the shafts to not mate fully and give an increased overall length. The result will be binding of the spigot bearing causing the shaft to be continually driven. The engine crankshaft will be thrust forward giving no end-float; this could result in engine damage.
- 4/5/6 Worn or damaged spigot bush. (Replace it with a new one) **NOTE:** When replacing the spigot bush only use oil for lubrication never pack the bush in the crankshaft with grease. If grease is used in this manner the bush could be forced out of the crankshaft when the input shaft is inserted.
- 4/6/7 The hydraulic lines and/or cylinders could have air in them. (Bleed the system)

NOTE: Some systems require pressure bleeding to remove all air.

- 4/6/7 The slave cylinder bore may be too small, thus not giving enough stroke for proper clutch operation. (See the kit instructions for details, re-sleeve or by a new slave cylinder)

Hints

The slave cylinder only requires a stroke of 15mm to 20mm of travel for correct clutch operation.

Never make an adjustable push rod or longer push rod that can cause the thrust bearing to run against the pressure plate fingers. **NOTE:** If you do need to make one make sure you allow enough clearance between the bottom of the slave cylinder and the piston to allow for future clutch wear.

NOTE: You must always have some pushrod free play, if you don't the fluid can't return back to the reservoir. This will result in premature wear of the thrust bearing and pressure plate fingers and/or the clutch could also slip.

Never use grease on the clutch spline as in the long term it can cause the clutch plate to stick on the shaft. Clutch dust mixes with the grease to form a very thick paste.

Centrifugal force can also throw grease over the clutch face causing it to shudder or slip.

Proudly Manufactured by:

Marks 4WD Adaptors

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